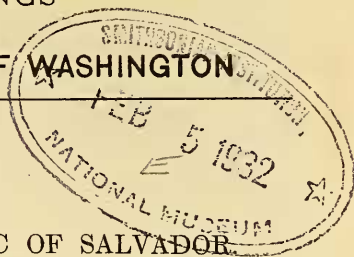


PROCEEDINGS
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FERNS OF THE REPUBLIC OF SALVADOR

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The specimens upon which the present paper is based were collected chiefly by Mr. Standley from December, 1921, to May, 1922, during a visit to Salvador for the purpose of making a general botanical survey of that country. The writers have had also the opportunity of examining collections made by Dr. Salvador Calderón, of the Salvadorean Department of Agriculture, which contain several species not otherwise known from the region.

Previous to the work done in 1921-22, Salvador was little known botanically, having been neglected by collectors, perhaps because of its comparative inaccessibility. It is the only one of the five Central American republics lacking an Atlantic coast-line. Within its territory, however, Salvador has better transportation facilities than any adjacent region, a varied topography distinguished for its beautiful and interesting scenery, and a population that is notably kindly and hospitable toward visitors. It is the smallest of the Central American countries and the most densely settled, its total population being exceeded only by that of Guatemala, which is several times as large geographically.

As might be inferred from the density of population, a great part of Salvador is under cultivation, the region being thus in some respects less favorable for botanical work than most tropical countries. Nevertheless there are many areas as yet untilled, and in the higher mountains and coastal lowlands there remain virgin forests possessing a rich and interesting flora. The total number of species of vascular plants now known from Salvador is about 2,000. This is fewer than

recorded for most of the other Central American states, but the discrepancy is largely explained by physical features. The country lies wholly upon the Pacific slope, consequently the flora is homogeneous; there are no very high mountains, the greatest of the numerous volcanoes attaining an elevation of scarcely 2,400 meters; and the rainfall is comparatively scant, approximately 60 inches per year, with the result that there are none of the wet forests that characterize certain portions of each of the other republics.

The lack of moisture makes the region an unfavorable one for ferns, only 87 species being listed herewith. When other parts of Salvador have been thoroughly explored this number will be materially increased, for upon the highest mountains there must remain many species still unknown. It seems worth while, however, to publish the present list, incomplete as it may be, because it is the first separate contribution to a knowledge of the fern flora of the country.

The eastern third of Salvador is very low and hot, and few ferns occur there. The central and western portions, away from the coast, consist of a tableland with an elevation of about 600 meters, largely given over to agriculture. Above this plateau rise many isolated volcanoes and one or two mountain ranges. The lower slopes of the mountains, which would naturally be of great interest botanically, are devoted to coffee growing, the natural vegetation having thus become almost obliterated. Upon the higher slopes of the mountains there still remain, as already mentioned, certain areas of natural forest. Here there are more abundant rainfall and a relatively luxuriant vegetation, the trunks of the closely set trees being covered with mosses, ferns, orchids, and other epiphytes. It is this region which will best repay future exploration.

In general, however, ferns are not a conspicuous feature of the vegetation in Salvador, and as a rule not very many species are to be found in a given locality. The most productive localities visited were the mountain ravines about Ahuachapán, in the extreme western part, and the high slopes of the Volcano San Vicente, near the center of the Republic. At these places a number of rare and interesting species were collected. At lower altitudes the species are mostly those of wide distribution in the American tropics, and consequently of minor interest.

One who associates tree ferns with ideas of tropical vegetation would be disappointed in Salvador, since these handsome plants are of rare occurrence. It is probable that they were more plentiful formerly, before the general removal of the forest cover, and that their disappearance has resulted from the destruction of a suitable habitat.

In the following list collectors' numbers are cited only for the rarer or more interesting species.

CERATOPTERIDACEAE.

Ceratopteris pteridoides (Hook.) Hieron.

Abundant in the Lake of Maquigüe (60 meters), in eastern Salvador, floating in shallow water at the edge of the lake and in ditches.

SCHIZAEACEAE.

Anemia hirsuta (L.) Swartz.

Vicinity of San Salvador, on open banks; occasional at 650 to 850 meters altitude.

Anemia phyllitidis (L.) Swartz.

Rather frequent in the central and western departments, at 350 to 1,400 meters altitude; on stream banks, in forest, or on shaded brushy slopes.

Anemia sp.

Vicinity of San Salvador (*Calderón* 918). Perhaps new; consisting of several large, detached, fully fertile fronds, with triangular-ovate leafy blades 15 cm. long and nearly 10 cm. broad, the pinnae 1.5 cm. broad and closely, shallowly, and obliquely lobed. The alliance is with *A. hirsuta* and *A. jaliscana* Maxon.

Lygodium polymorphum (Cav.) H. B. K.

Very common at low and middle elevations, and ascending well up into the mountains (1,000 meters); climbing in hedges or thickets. The vernacular names are *crepillo* and *palmera*, and medicinal properties are attributed to the plant.

Cyathea mexicana Schlecht. & Cham.

Sierra de Apaneca, Department of Ahuachapán, along stream in forest (*Standley* 20199). Vernacular name *pescadillo*.

Portions of a young sterile plant, referred to this species with doubt. The curved acicular spines of the stipe are 5 to 7 mm. long, a development never seen in mature plants of *C. mexicana* and very likely due to youth. The pinnae are atypical in several particulars also, apparently owing to the excessive vigor of the rapidly growing plant.

Hemitelia costaricensis (Klotzsch) Mett.

About San Salvador a few juvenile plants are found in deep quebradas (Standley 9168), and the species is sometimes seen in cultivation in gardens. At Tonacatepeque specimens were taken from a cultivated plant. This had a slender trunk 2 meters high, and was said to have been obtained in the mountains near by. Tree ferns are very rare in Salvador. A few were seen in the mountains near Ahuachapán, on a cliff where it was impossible to reach them.

Cibotium guatemalense Reichenb.

The record is based upon specimens said to have come from the upper slopes of the Volcano of San Salvador (Calderón 688). The tops of the trunks, with the undeveloped leaves, are covered with a silky mass of long, soft, golden, threadlike scales that suggest hair or fur. These trunks are brought to the market of San Salvador, where, under the name *micos* ("monkeys"), they are sold for use as decorations in the houses and churches. Large quantities were upon sale the Third of May, the Day of the Cross, a festival during which there is erected in every home a cross, which is decorated with flowers and other ornamental objects.

POLYPODIACEAE.

Acrostichum sp.

Large plants of one of the species of *Acrostichum*, probably *A. aureum* L., were seen in an inaccessible location in the swamp at Ateos.

Elaphoglossum revolvens (Kunze) C. Chr.

Sierra de Apaneca, on tree trunk (Standley 20172).

Vittaria lineata (L.) J. E. Sm.

Pendent on tree trunks, Volcano of San Vicente, at 1,500 meters altitude.

Loxogramme salvinii (Hook.) Maxon.

On tree trunk, Volcano of San Vicente, at 1,500 meters altitude (Standley 21561). Known otherwise from eastern Guatemala and the mountains of western Panama.

Polypodium furfuraceum Schlecht. & Cham.

On trees, San Salvador, at 650 to 800 meters altitude. The vernacular name, *hierba de centupicé*, is said to be explained by the fact that the leaves are bound upon centipede stings to relieve the pain.

Polypodium plebeium Schlecht. & Cham.

On a shaded rock, Volcano of San Vicente, at 1,500 meters altitude (Standley 21545).

Polypodium plumula Humb. & Bonpl.

On trees, central and western departments, chiefly in mountain forests, but occurring also about San Salvador. It is a fairly common species, ranging from 650 to 1,500 meters elevation.

Polypodium polypodioides (L.) Watt.

Rather common upon trees in the mountains at 1,000 to 1,500 meters elevation.

Polypodium brasiliense Poir.

A single collection: San Salvador (*Calderón* 839).

Polypodium lowei C. Chr.

On a shaded rock, Volcano of San Vicente, at 1,500 meters (*Standley* 21568). In this and similar large species of *Polypodium* the leaves wither and fall during the dry season, and at that period only the naked chaffy rootstocks are to be seen. The present specimen is in poor condition, yet shows clearly the anomalous venation well known to characterize this species.

Polypodium plesiosorum Kunze.

San Salvador (*Calderón* 1286); Colina de Santa Tecla (*Calderón* 1788); Izalco (*Calderón* 1711). The specimens are referred to this species in its usual inclusive sense. They are ample and well fruited.

Polypodium sanctae-rosae (Maxon) C. Chr.

Volcano of San Vicente, on tree trunk, at 1,500 meters (*Standley* 21484). An interesting extension of range. This species was described from Guatemalan specimens and has since been reported from southern Mexico.

Polypodium angustifolium Swartz.

Common in the central and western departments, chiefly in the mountains, but abundant about San Salvador, the altitudinal range being from 600 to 1,500 meters. The large masses of pendent leaves are very frequent upon shade trees in coffee plantations.

Polypodium xalapense (Fée) Christ.

Sierra de Apaneca Colina de Santa Tecla, and Volcano of San Vicente; upon mossy tree trunks and upon a moist bank in deep shade; altitude 1,000 to 1,500 meters.

Polypodium astrolepis Liebm.

Sierra de Apaneca, on tree trunk; vicinity of San Salvador, on trees and coffee bushes. In Salvador this is a mountain species, ascending to 1,000 meters. It is probably common, but the fronds during the dry season are shriveled and thus are easily overlooked.

Polypodium angustum (Humb. & Bonpl.) Liebm.

Common on tree trunks in mountains of the central departments, at 800 to 1,800 meters elevation.

Polypodium aureum L.

A single collection: Volcano of San Salvador, at about 1,500 meters, on tree trunk (*Standley* 22948a).

Adiantum andicola Liebm.

Volcano of San Vicente, in moist forest at 1,500 meters (*Standley* 21541).

Adiantum concinnum Humb. & Bonpl.

Perhaps the most common fern of Salvador, abundant in many localities, chiefly at middle altitudes, especially on the high perpendicular shaded banks of volcanic ash which border many of the roads. The vernacular name is *pie de zanate*. A decoction of the plant is said to be given to women after parturition.

Adiantum fruticosum Kunze.

Ahuachapán, in coffee plantation, at 1,000 meters altitude (*Standley* 19844). In the absence of authentic material of this species and *A. tetraphyllum* Humb. & Bonpl. the identification of the present specimen is doubtful. Under the latter name are roughly grouped several fairly well-marked regional forms of tropical North America, each with attendant variations correlated with habitat, age, and fertility.

Adiantum philippense L.

Near Finca San Nicolàs (*F. Choussy*). Merrill has shown that this name, published in 1753, must be taken up for the present plant, which has commonly been called *A. lunulatum* Burm., 1763. The species is not uncommon in the drier lowlands of Panama and is at least locally abundant in parts of Central America, especially in western Nicaragua. It is one of the few ferns truly common to the tropics of both hemispheres.

Adiantum macrophyllum Swartz.

Occasional in the central and western departments, on moist shaded banks at 500 to 1,000 meters altitude.

Adiantum patens Willd.

A single collection: San Salvador (*Calderón* 1186).

Adiantum poiretii Wikstr.

Volcano of San Salvador, on moist shaded bank at 1,500 meters altitude (*Standley* 22889).

Adiantum trapeziforme L.

Sierra de Apaneca, in forest; vicinity of San Salvador, on banks along streams, at 650 to 850 meters elevation. Vernacular name, *culantrillo* (Sierra de Apaneca).

Adiantum trapezoides Fée.

Common, especially in the central departments, at 1,000 meters altitude or less; on river banks or dry or moist slopes; abundant along roadsides in some localities. Vernacular name, *pie de zanate*. An extremely well marked species, now known to range from Mexico throughout Central America to Colombia.

Cheilanthes intramarginalis (Kaulf.) Hook.

Open banks about the crater rim, Volcano of San Salvador, at 1,800 meters.

Cheilanthes angustifolia H. B. K.

Pine forest, Cerro Roblar, Dept. Chaltenango (*Calderón* 2476).

Hemionitis palmata L.

Near Ahuachapán, in a deep wooded ravine, at 800 to 1,000 meters altitude (*Standley* 19894).

Hemionitis pinnatifida Baker.

San Salvador (*Calderón* 1273).

Doryopteris concolor (L. & F.) Kuhn.

Two collections: Izalco (*Calderón*).

Notholaena brachypus (Kunze) J. Sm.

Abundant locally in the central and eastern departments, on dry open slopes or on rocks at 60 to 500 meters altitude. The fronds are shriveled during the dry season, but unfold after the first rains.

Pellaea skinneri Hook.

A single collection: Izalco (*Calderón*).

Pityrogramma calomelaena (L.) Link.

Common in many places at middle altitudes, usually on open banks; abundant by roadsides.

Pityrogramma peruviana (Desv.) Maxon.

Abundant on dry open banks of loose gravel about San Vicente, altitude 350 to 500 meters (*Standley* 21659). Probably of wide distribution in Salvador.

Pteridium arachnoideum (Kaulf.) Maxon.

Cerro del Guayabal, at 1,440 meters altitude (*Calderón* 2008). The vernacular name is *pecho de caballo*.

Pteridium caudatum (L.) Maxon.

Abundant in dry pine forest near Santa Ana, the plants 1 to 2 meters high; common on the rim of the crater of the Volcano of San Salvador; a common weed in coffee plantations on the Volcano of San Vicente; at 900 to 1,800 meters. Vernacular names, *palma* and *crespillo*. Variable, and perhaps not all properly referred to this species.

Pteris biaurita L.

San Salvador and Tonacatepeque, on moist shaded banks, at 650 to 1,000 meters altitude; frequent.

***Pteris grandifolia* L.**

San Vicente, on a wet stream bank at 400 meters; plants very large and conspicuous.

***Pteris quadriaurita* Retz.**

Common in the central and western departments, on moist banks or in forest, at 700 to 1,200 meters elevation.

***Pteris kunzeana* Agardh.**

A single collection: Izalco, on shaded stream bank (*Standley* 21876).

***Pteris mexicana* (Fée) Fourn.**

A large and showy plant, in the big swamp at Ateos (*Standley* 23345).

***Trismeria trifoliata* (L.) Diels.**

San Vicente, on rocky river bank; San Marcos, on moist open banks of white volcanic ash. Its altitudinal range is from 350 to 800 meters.

***Asplenium formosum* Willd.**

On a shaded bank near San Vicente, and in a cafetal near Ahuachapán; 500 to 1,000 meters altitude.

***Asplenium fragrans* Swartz.**

On tree trunks, Sierra de Apaneca, Colina de Santa Tecla, and Volcano of San Vicente, at about 1,500 meters. The plants have a delicate and characteristic fragrance.

***Asplenium hastatum* Klotzsch?**

Volcano of San Vicente; a single imperfect plant (*Standley* 21607), found upon a tree trunk.

***Asplenium praemorsum* Swartz.**

On tree trunks, Volcano of San Vicente, at 1,500 meters (*Standley* 21606).

***Asplenium standleyi* Maxon.**

Ahuachapán and Sierra de Apaneca, at 1,000 to 1,500 meters, growing on moist banks in forest.

***Asplenium* sp.**

Volcano of San Vicente, at 1,200–1,500 meters, on tree trunk (*Standley* 21574). Specimens imperfect; probably a new species, in the group of *A. lunulatum* Swartz.

***Asplenium virillae* Christ.**

Ahuachapán, on a moist shaded bank in ravine, at 1,000 meters altitude (*Standley* 19774.) This rare species was originally described from Costa Rica and has since been collected in the adjacent region of Chiriquí, western Panama. A Santa Marta specimen (*H. H. Smith* 2451) so referred by Christ is not this species.

Athyrium skinneri Moore.

Izalco (*Calderón*). Specimens are at hand from Mexico to Colombia. The species is particularly abundant in western Nicaragua.

Blechnum fraxineum Willd.

Found only once, growing in abundance upon a moist shaded bank in a quebrada or gully in the edge of San Salvador at 650 meters altitude (*Standley* 19589). This species, taken in its current sense, is undoubtedly an aggregate.

Blechnum occidentale L.

Common at middle and upper elevations, especially in the mountains; on shaded rocks and earth banks or in forest, at 800 to 1,500 meters. As represented in Salvador, the species is a variable one. One of the collections (*Standley* 21490) is a small hairy form, with narrow long-attenuate blades, sometimes referred to *B. glandulosum* Link.

Diplazium denticulosum (Desv.) C. Chr.

Collected at several localities in the central and western departments, at 350 to 900 meters elevation, growing on shaded stream banks, moist banks of quebradas, and in wet fields.

Diplazium franconis Liebm.

Ahuachapán, on moist shaded bank in ravine, altitude 1,000 meters (*Standley* 19773).

Diplazium donnell-smithii Christ.

Volcano of San Salvador, on moist bank in forest at 1,500 meters (*Standley* 22964; *Calderón* 458). Known previously from Honduras and eastern Guatemala.

Cyclopeltis semicordata (Swartz) J. Sm.

San Vicente, on shaded stream bank, altitude 350 meters (*Standley* 21739).

Dryopteris dentata (Forsk.) C. Chr.

San Vicente, Ateos, and Nahulingo, in wet thickets, from near sea level to 500 meters elevation. Vernacular name, *palmarín*.

Dryopteris equestris (Kunze) C. Chr.

Ahuachapán, on moist shaded slope of ravine, at 1,000 meters altitude (*Standley* 19758).

Dryopteris gongyloides (Schkuhr) Kuntze.

Ateos, in edge of swamp (*Standley* 23376).

Dryopteris nicaraguensis (Fourn.) C. Chr.

Ahuachapán, on moist bank in ravine, at 1,000 meters altitude (*Standley* 19770).

Dryopteris normalis C. Chr.

Ahuachapán, on shaded stream bank, at 1,000 meters elevation (*Standley* 20004). Apparently an uncommon plant in Salvador.

Dryopteris concinna (Willd.) Kuntze.

Cerro del Guayabal, at 1,400 meters altitude (*Calderón* 1994).

Dryopteris panamensis (Presl.) C. Chr.

Common in the central and western departments, at 500 to 800 meters elevation, on open banks or in moist thickets; often seen along roadsides. The vernacular name was given as *pescado de monte*, and a decoction of the plant was said to be given internally in the treatment of wounds.

Dryopteris patens (Swartz) Kuntze.

Common in the central and western departments, at 350 to 1,000 meters elevation, on shaded banks, in forest, or along streams.

Dryopteris subtetragona (Link) Maxon.

Collected in wet thickets at several localities in the central and western departments, at 200 to 600 meters altitude, but it is apparently scarce. Vernacular name, *palmera*.

Leptochilus cladorrhizans (Spreng.) Maxon.

San Vicente, in wet thicket; Ahuachapán, on moist bank in deep ravine. The altitudinal range is from 350 to 1,000 meters.

Polystichum distans Fourn.

Volcano of San Vicente, on moist bank in forest, at 1,500 meters altitude (*Standley* 21578). This is exactly the typical Mexican plant.

Polystichum ordinatum (Kunze) Liebm.

Volcanoes of San Salvador and San Vicente, and Sierra de Apaneca, in forest at about 1,500 meters elevation. Several collections, representing a characteristic form of this widely spread species.

Tectaria dilacerata (Kunze) Maxon.

Common in the central and western departments, on stream banks or moist shaded slopes, at 150 to 1,000 meters elevation. This species was originally described, as *Aspidium dilaceratum* Kunze, from cultivated material of Guatemalan origin. It is widely distributed in Central America and is represented by numerous specimens in most recent collections.

Tectaria heracleifolia (Willd.) Underw.

Common and widely distributed, along streams or on moist shaded banks, at 100 to 800 meters elevation.

Tectaria martinicensis (Spreng.) Copel.

Nahulingo, in wet thicket, at about 220 meters altitude (*Standley* 22035).

Dennstedtia adiantoides (Humb. & Bonpl.) Moore.

Ahuachapán and Sierra de Apaneca, in forest or on moist shaded banks; common, ascending to 1,000 meters.

HYMENOPHYLLACEAE.

Hymenophyllum myriocarpum Hook.

On tree trunk, Volcano of San Vicente, at 1,500 meters elevation (*Standley* 21584). The specimens are thoroughly characteristic.

Trichomanes kunzeanum Hook.

Sierra de Apaneca, scandent on tree trunks (*Standley* 20193, 20202). Probably best regarded as an extreme form of *T. radicans* Swartz.

SALVINIACEAE.

Azolla caroliniana Willd.

Santa Emilia, in an irrigation ditch; Ixtepeque, in the edge of a stream; San Martín; 135 to 400 meters. Vernacular names, *hierba del agua* and *doradilla*.

Salvinia auriculata Aubl.

Lake of Maquigüe, in eastern Salvador; the most abundant plant of the lake, occurring in great masses everywhere along the shores (*Standley* 20904). Laguna de Olomega, at edge of lake (*Standley* 21039). The vernacular name of the latter specimens was given as *cadenilla*.

EQUISETACEAE.

Equisetum giganteum L.

Ateos, abundant in the great swamp at this place. The old branched stems are 1 to 3 meters high, and form dense erect clumps, especially where supported by tree trunks.

LYCOPODIACEAE.

Lycopodium reflexum Lam.

A few small plants growing under *Fuchsia* bushes in a grassy thicket on the rim of the crater of the Volcano of San Salvador, at 1,800 meters (*Standley* 22807).

Lycopodium taxifolium Swartz.

Volcano of San Vicente, at 1,500 meters, pendent from tree trunks (*Standley* 21580). The plant, which was very scarce where collected, is said to be more common higher up on the volcano. It was grown in hanging baskets at a house upon the finca. Vernacular name, *riendilla*.

Lycopodium complanatum tropicum Spring.

Collected in the mountains of Ahuachapán by Dr. S. A. Padilla (no. 170), who gives the vernacular name as *periquito*.

SELAGINELLACEAE.

Selaginella cuspidata elongata Spring.

Very common in the central departments, at 350 to 800 meters, growing usually upon dry open banks. During the dry season the plants wither, but upon the advent of the rainy season put forth new fronds. Except for this species, *Selaginellas* appear to be very rare in Salvador.

Selaginella hoffmanni Hieron.

Ahuachapán, on moist shaded bank in a ravine at 1,000 meters (*Standley* 19757).

Selaginella nicaraguensis Baker.

La Cebadilla (*Calderón* 1227). This species, which appears to be rare in collections, is extremely common in western Nicaragua.